

## Work Plans for Supplemental SFS Evaluations

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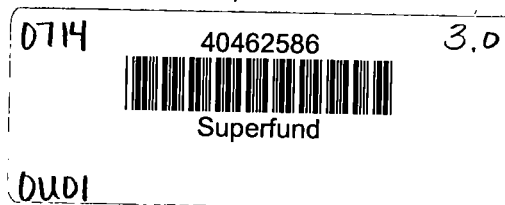
## 3 Attachments



Work Plan- Alternative Area 2 RIM Volume.pdf Work Plan - Apatite Technology.pdf Work Plan - Discount Rate.pdf

Attached please find Work Plans for the following additional SFS evaluations as requested in EPA's 10-12-12 letter:

1. Alternative Excavation Volume;
2. Evaluation of Apatite Treatment Technologies; and



3. Additional Present Value Cost Estimates.

We are still working on preparation of Work Plans for the Partial Excavation Alternative, Alternative Landfill Covers, and Fate and Transport Modeling.

Please do not hesitate to contact me if you have questions regarding these work plans or any other aspect of the OU-1 work.

Paul.

## **Work Plan**

### **Alternative Area 2 Excavation Depths and Volumes**

#### **Introduction**

EPA's October 12, 2012 letter to the West Lake Landfill Operable Unit 1 (OU-1) Respondents states that, during an early consultation with the National Remedy Review Board (NRRB), the NRRB indicated that the deeper radiological detections in borings WL-210 and WL-235 are unreliable. Consequently, EPA has asked that the volume of radiologically-impacted material (RIM) considered for possible excavation under the "complete rad removal" alternatives be revised to exclude deeper intervals in soil borings WL-210 and WL-235 in Area 2.

Evaluation of the soil sample analytical results and the downhole gamma logging data during preparation of the SFS indicated that soil containing radionuclides above the levels used to identify material to be included within the scope of the two "complete rad removal" alternatives was potentially present within a deeper depth interval beneath the southwestern portion of Area 2. Specifically, elevated gamma peaks were identified on the downhole gamma logs at depths of 47.5 feet (ft) below ground surface (bgs) in WL-210 and 22.5 ft bgs in WL-235; however, the Remedial Investigation (RI) [EMSI, 2000] states (on p. 97) that boring WL-210 was re-logged because during the first logging attempt, material was knocked into the hole and that the presence of this material may have been the cause of a small poorly defined peak at the bottom of this boring. The RI also states (again on p. 97) that the presence of a poorly defined peak at the bottom of WL-235 may also be the result of RIM at shallow depths having been knocked into this borehole during drilling or logging activities.

Although the RI raised possible questions about the representativeness of the downhole gamma logs for the deeper intervals of these two borings, a soil sample obtained from boring WL-210 detected the presence of total Thorium-230+232 at a depth of 40 ft bgs at a level (18.6 pCi/g) above the cleanup level (7.9 pCi/g) used to evaluate potential excavation alternatives. A duplicate sample obtained from this same depth interval contained total thorium at 11.6 pCi/g. These samples were obtained from a depth of 40 ft, 10 feet above the bottom of the borehole. In addition, these samples were obtained during drilling of the borehole, prior to the downhole logging activities that may have resulted in surficial material being knocked into the hole. Therefore, these sample results likely represent actual conditions at the 40 ft depth interval in boring WL-210. The RI sampling did not include collection of a soil sample from the deeper portion of the WL-235.

Although uncertainty exists regarding the representativeness of the downhole gamma logs at these two locations, the soil sample result from the 40 ft depth in WL-210 combined with the downhole gamma logs were used to define an area and volume of a deeper interval of RIM occurrence beneath the southwestern portion of Area 2. This material and the associated overburden material that would need to be removed to allow for excavation of this RIM, were included within the overall volumes of materials that would need to be excavated if one of the "complete rad removal" alternatives were to be

implemented at the site. (Note: Deeper intervals of radiologically-impacted material were also identified beneath other portions of Area 2 but are not the subject of this re-evaluation).

Because of the uncertainty associated with the downhole gamma logging at these two locations, EPA has indicated that the NRRB believes the radiological detections in the deeper portions of these two borings are unreliable. EPA has therefore requested that the volumes of materials that may be removed under a "complete rad removal" alternative be re-estimated to exclude the deeper depth intervals in borings WL-210 and WL-235.

### **Approach**

The following approach will be used to develop a revised excavation volume for Area 2:

1. Revise the calculated volume of material to be excavated under the "complete rad removal" alternatives to eliminate deeper intervals in soil borings WL-210 and WL-235 and consequently to eliminate removal of the deeper interval of RIM material from the southwestern portion of Area 2; and
2. Develop revised estimates of the potential risks to workers and the public, revised projected construction schedules, and revised cost estimates for excavation and offsite or onsite disposal based on exclusion of the potential deeper occurrences of RIM beneath the southwestern portion of Area 2.

### **Deliverables**

The following deliverables will be prepared pursuant to this task

1. Interim Deliverable – A brief memorandum will be prepared summarizing the revisions to the RIM extent and volumes resulting from exclusion of the deeper interval beneath the southwestern portion of Area 2. If the re-evaluation of the volume material results in significant changes in the amounts of materials that would be excavated under the "complete rad removal" alternatives, this memorandum will also include evaluations of potential risks, revised calculations of greenhouse gas emissions, revised anticipated project schedules, and revised anticipated costs for the two "complete rad removal" alternatives based on the assumption that the deeper intervals in borings WL-210 and WL-235 are not included in the volume of RIM material under the two "complete rad removal" alternatives.
2. SFS Revisions – The existing SFS text, tables and appendices will be amended to include the results of alternative development and evaluation based on exclusion of the deeper intervals in borings WL-210 and 235 in conjunction with the existing discussions that include these depth

intervals as presented in the current SFS report. Subject to EPA comments on the Interim Deliverable, the following specific revisions to the December 2011 SFS report are anticipated:

a. Amend the text of the SFS as follows:

- i. Section 5.3.1 – Include as part of the descriptions of the excavation and disposal alternatives the volumes of RIM and overburden material to be excavated if the reported deeper occurrences in borings WL-210 and WL-235 are not considered in addition to the total volumes already presented in this section
- ii. Sections 6.2.2 and 6.2.3 – Include as part of the descriptions of the excavation and disposal alternatives the volumes of RIM and overburden material to be excavated if the reported deeper occurrences in borings WL-210 and WL-235 are not considered in addition to the total volumes already presented in this section
- iii. Sections 6.2.2.5 and 6.2.3.5 – Add to the discussions of Short-Term Effectiveness, in particular the Protection of the Community, Protection of Workers, and Time Until RAOs are Achieved, discussions relative to the reduced volume of material and consequently reduced time frames that would be associated with excavation and disposal alternatives if the reported deeper occurrences in borings WL-210 and WL-235 are not considered
- iv. Sections 6.2.2.7 and 6.2.3.7 – Add to the discussion of Cost, the estimated costs to implement the excavation and disposal alternatives based on the reduced volume of material and consequently reduced time frames that would be associated with excavation and disposal alternatives if the reported deeper occurrences in borings WL-210 and WL-235 are not considered
- v. Sections 7.2.3 (Short Term Effectiveness) and 7.2.5 (Cost) – Revise the comparative analysis of alternatives to reflect the differences between the short-term risks, schedules and costs that result from inclusion or exclusion of the deeper intervals in borings WL-210 and WL-235

b. Amend the Appendices to the SFS as follows:

- i. Appendix B – Develop and include an alternative excavation plan that does not include excavation of the deeper intervals at WL-210 and WL-235 and calculate the revised volume of RIM and overburden material to be excavated.
- ii. Appendix H – Develop and include estimates of the potential risks to the community and workers based on the volumes of RIM and overburden material to be excavated and revised construction schedules if the deeper intervals in borings WL-210 and WL-235 are not considered
- iii. Appendix I – Prepare additional estimates of Greenhouse Gas Emissions associated with the “complete rad removal” alternatives under a scenario where the deeper intervals in borings WL-210 and WL-235 are not considered

- iv. Appendix J – Prepare additional construction schedules for the “complete rad removal” alternatives under a scenario where the deeper intervals in borings WL-210 and WL-235 are not considered
- v. Appendix J – Prepare additional estimates of the construction costs (both fiscally constrained and not-fiscally constrained) for the “complete rad removal” alternatives under a scenario where the deeper intervals in borings WL-210 and WL-235 are not considered

#### **Clarifications by EPA**

No additional information or clarifications are being requested from EPA at this time relative to this task.

#### **Anticipated Schedule**

It is anticipated that it will take approximately two months to develop the interim summary memorandum.

Preparation of a Supplemental SFS report that includes the results of the revised Area 2 excavation volumes and associated evaluations, as described in the interim deliverable summary memorandum, will be performed once EPA comments on the interim deliverable are received and in conjunction with revisions to the existing SFS report required to address the results of the various other additional tasks EPA has requested.

#### **References**

Engineering Management Support, Inc. (EMSI), 2011, Supplemental Feasibility Study, Radiologically-Impacted Material Excavation Alternative Analysis, West Lake Landfill Operable Unit-1, December 16.

EMSI, 2000, Remedial Investigation, West Lake Landfill Operable Unit-1, April 10.

## **Scope of Work and Schedule**

### **Evaluation of the Use of Apatite/Phosphate Treatment Technologies**

#### **Introduction**

EPA's October 12, 2012 letter indicated that the National Remedy Review Board recommended that more detailed evaluations of potential treatment technologies be conducted as part of a Supplement to the Supplemental Feasibility Study [SFS] (EMSI, 2011). Consequently, EPA has asked the Respondents to evaluate the potential application of apatite and/or phosphate solutions for possible treatment of waste materials and/or groundwater. EPA requested that this evaluation be performed at a level of detail comparable to that used to evaluate the treatment technologies previously analyzed in the SFS.

#### **Approach**

Typically, the first step in the identification of potentially applicable remedial technologies is to evaluate general response actions that, based on site conditions and media of concern, could address the remedial action objectives (RAOs) at a site. The RAOs developed for OU-1 did not include direct treatment of the waste materials or treatment of groundwater. Consequently, potential remedial technologies related to these response actions were not evaluated in the FS (EMSI, 2006) or the SFS (EMSI, 2011). For purposes of conducting an evaluation of potential apatite treatment technologies, this initial step, evaluation of general response actions based on site conditions and media of concern, will be skipped. Instead, to comply with EPA's direction, the evaluation will be based on a hypothetical scenario where treatment of the waste materials and/or treatment of groundwater have been deemed appropriate response actions relative to the site conditions and media of concern. In the event that apatite treatment technology is determined to potentially be applicable to OU-1, it may be necessary to revisit the evaluation of general response actions and the identification of other potentially applicable remedial technologies.

Evaluation of the potential applicability of apatite or other phosphate-based treatment technologies will be performed using the same approach used to evaluate other potential remedial technologies under a Feasibility Study level-of-effort. The first step will be to identify potential apatite/phosphate-based treatment technologies and perform an initial screening of the technical implementability of such technologies relative to the waste and site conditions. The anticipated approach to the evaluation of potential application of apatite treatment technology will be based on the following:

1. Review of available published literature; and
2. Discussions with DOE individuals with knowledge of the use and applicability of apatite injection technology.

Subject to results of the initial evaluations, possible applications of apatite/phosphate-based technologies to West Lake Landfill OU-1 may include the following:

1. Injection into waste materials to reduce leaching of radionuclides; and/or
2. Use for treatment of radionuclide occurrences in groundwater.

If the initial evaluations of potential apatite/phosphate-based treatment technologies indicate that such technologies may potentially be applicable to the site and waste conditions in OU-1, these technologies will be subjected to further evaluations including evaluations of potential effectiveness, implementability and cost in accordance with the procedures prescribed in EPA's "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA, 1988).

### **Results of Preliminary Evaluations**

This section provides a summary of the results of initial evaluations completed prior to and during development of this scope of work. An initial search of technical literature (see References section below) and initial discussions with DOE personnel familiar with use of apatite-based technologies indicate the following:

1. Injection of apatite solution has been successful in halting migration of strontium-90 in groundwater at Hanford;
2. Bench-scale testing at Oak Ridge has indicated that apatite may be effective in treating uranium and heavy metals in groundwater (this reportedly was to be followed up by a pilot-scale test but reports of the results of the pilot-scale testing, if performed, have not yet been located);
3. No reports or information have yet been identified relative to the use of apatite to treat waste/source materials or relative to possible source treatment within a solid waste matrix; and
4. DOE representatives indicated that owing to the potential disruption in chemical equilibrium within the waste matrix, such an application could result in an increase in leaching potential of radionuclides instead of a reduction in leaching potential that would be intended by such an application.

Due to the lack of application of this technology for source stabilization, and in particular the complete lack of application to a source material composed of municipal solid waste, significant uncertainty exists relative to the potential applicability, effectiveness and possible unintended consequences of using apatite technology to attempt to reduce potential leaching of radionuclides from OU-1.

All published information identified to date relates to treatment of select radionuclides and heavy metals in groundwater. Specifically, the only published information located so far relative to treatment



of groundwater relates to treatment of strontium, uranium and heavy metals. No information exists regarding the potential use of apatite for treatment of radium or thorium.

Furthermore, EPA previously determined that there is no unacceptable risk of groundwater contamination at the site. Specifically, the ROD contains the following conclusions:

1. *These (groundwater sampling) results are not indicative of on-site contaminant plumes, radial migration, or other forms of contiguous groundwater contamination that might be attributable to the landfill units being investigated. (ROD at p. 20)*
2. *The groundwater results show no evidence of significant leaching and migration of radionuclides from Areas 1 and 2. (ROD at p. 21)*
3. *Significant leaching and migration of radionuclides to perched water or groundwater have not occurred despite landfilled waste materials having been exposed to worst-case leaching conditions from surface water infiltration over a period of decades. (ROD at p. 21)*
4. *The lack of radionuclide contamination in groundwater at the Site is consistent with the relatively low solubility of most radionuclides in water and their affinity to adsorb onto the soil matrix. (ROD at p. 21)*
5. *This pathway for migration (groundwater flow to the river) is not considered significant under current conditions because the on-site impact to groundwater from the landfill units is so limited. (ROD at p. 21)*
6. *The fourth (remedial action) objective (Collect and treat contaminated groundwater and leachate to contain any contaminant plume and prevent further migration from the source area) is not applicable because a plume of contaminated groundwater beneath or downgradient of the disposal areas has not been identified. (ROD at p. 30)*

Consequently, groundwater was not determined to be a media of concern (i.e., no plume of groundwater contamination exists) and treatment of groundwater was not identified as a potential response action for the site in the prior FS or SFS. Accordingly, groundwater treatment technologies were not evaluated in either the FS or SFS. If apatite technology were to be evaluated as a remedial alternative, it may be appropriate to also evaluate other possible groundwater treatment technologies.

Alternatively, apatite injection technology could be evaluated as a possible contingent action in the event that groundwater contamination occurs in the future. Again, if apatite technology were to be evaluated as a possible contingent action, there may be a need to evaluate other possible groundwater treatment technologies for use as possible contingent actions.

## **Deliverables**

1. Interim Deliverable – A brief memorandum will be prepared summarizing the results of the evaluation of potential applicability of apatite/phosphate-based treatment technologies to the waste materials and site conditions associated with OU-1. This interim deliverable will also include a recommendation relative to identification and evaluation of potential additional remedial alternatives that may be based on apatite treatment technologies.
2. SFS revisions – Assuming that the evaluation of apatite treatment technologies only entails evaluation of the potential applicability of this technology and does not result in development of new/additional remedial alternatives, the following revisions to the SFS report are anticipated:
  - a. Section 4 – Technology Screening to include evaluation of apatite treatment technology
    - i. Section 4.2 – identify apatite treatment technology as an additional technology to be evaluated in the SFS
      1. Note: May need to identify other possible groundwater treatment technologies and expand the SFS to include evaluation of these
    - ii. Section 4.3 – include a description of apatite injection technology
    - iii. Section 4.4 – either:
      1. Identify apatite treatment technology as a technology that was screened out; or
      2. Evaluate the implementability of apatite treatment technology for either:
        - a. Chemical stabilization of radionuclides in the waste mass (subject to determining that information exists on possible use of apatite in this manner); or
        - b. For use as possible contingent action in the event that groundwater contamination occurs in the future.
    - iv. Figure 24 – Add evaluation of the technical implementability of apatite treatment technology(ies) to this figure.
    - v. Figure 27 – Add evaluation of the anticipated effectiveness, implementability and cost of apatite treatment technology(ies).

In the event that apatite treatment technology is found to be potentially applicable based on the site and waste conditions, there may be a need to develop one or more additional remedial alternatives for detailed analysis in the Supplemental SFS report. Such an effort is not included with the scope of the evaluation of apatite treatment technology addressed by this Scope of Work.

## Clarifications by EPA

EMSI requests clarification from EPA regarding EPA's expectations relative to potential application of apatite and/or phosphate treatment technologies at the site. To date, review of the technical literature and information from other sites has only resulted in identification of application of apatite/phosphate technology for treatment of groundwater. EMSI has not identified any technical literature discussing potential application of apatite and/or phosphate solutions as methods of treating waste/source materials. Therefore, EMSI requests any information EPA can provide regarding known or potential applications of such technologies for direct treatment of waste.

EMSI wastes to discuss with EPA the possible role of apatite or other groundwater treatment technologies relative to preparation of a Supplemental SFS report. These include the following:

1. How the SFS should address the lack of/minimal nature of impacts to groundwater relative to any evaluation of potential apatite treatment technology for groundwater given that:
  - a. Groundwater was not identified as a media of concern in the FS or SFS and therefore general response actions and remedial technologies for groundwater were not identified or evaluated in either document.
  - b. Groundwater treatment was not identified as being necessary (see above language from the ROD).
2. Evaluation of apatite treatment as a possible contingent technology
  - a. Apatite technology could be evaluated as a technology for possible use as a contingent action in the event that significant groundwater impacts arise in the future.
  - b. Would there be a need to evaluate other possible technologies that could possibly be used as contingent technologies in the event of future groundwater impacts?
3. Evaluation of apatite treatment (or other contingent groundwater technologies) would be limited to identification and screening of technologies for possible future contingent applications. This would not result in development or evaluation of a remedial alternative(s) for groundwater treatment.
4. Overall evaluation of apatite treatment of groundwater is inconsistent with the FS guidance. Specifically, as groundwater was not identified as a media of concern, the FS and SFS did not identify, screen or evaluate technologies for groundwater treatment.
5. Obtain additional information that EPA may be aware of on prior applications and experience with apatite treatment technology.

## **Schedule**

It is anticipated that collecting available information on potential use of apatite/phosphate-based treatment technologies, screening of the potential implementability of such technologies to the waste materials and site conditions at OU-1, evaluating the potential effectiveness, implementability, and cost of such potential applications, if appropriate, and preparing a summary memorandum will take approximately six weeks after receipt of EPA clarifications to the items identified above.

Preparation of a Supplemental SFS report that includes the results of the evaluations of apatite/phosphate-based treatment technologies will be performed once EPA comments on the interim deliverable are received and in conjunction with revisions to the existing SFS report required to address the results of the various other additional tasks EPA has requested.

## **References**

Engineering Management Support, Inc. (EMSI), 2011, Supplemental Feasibility Study, Radiologically-Impacted Material Excavation Alternative Analysis, West Lake Landfill Operable Unit-1, December 16.

EMSI, 2006, Feasibility Study, West Lake Landfill Operable Unit-1, May 8.

U.S. Environmental Protection Agency (EPA), 2008, Record of Decision – West Lake Landfill Site, Bridgeton Missouri, Operable Unit 1, May.

EPA, 1988, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA – Interim Final, EPA 540/G-89/004, OSWER Directive 9355-3-01, October.

## **Technical References – Apatite Treatment Technology**

Bostick, William D., undated, Abstract – The Use of Apatite for Chemical Stabilization of Subsurface Contaminants: Phosphate-Induced Metals Stabilization (PIMS) for Remediation of Radionuclides and Heavy Metal Contaminants at DOE Sites, emp-13.

Department of Ecology, State of Washington, 2010, Focus on Blocking Strontium – All About Apatite, Publication 06-05-008, July.

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Department of Ecology, State of Washington and United States Environmental Protection Agency, 2007, Considerations for Cleanup of the Hanford 200 Area National Priorities List Site, December.

Department of Ecology, State of Washington, undated, Apatite – Blocking strontium from reaching the Columbia River, <http://www.ecy.wa.gov/programs/nwp/apatite.htm>

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Wellman, D. M., Pierce, E.M., Bacon, D. H., Oostrom, M., Gunderson, K. M., Webb, S. M., Bovaird, C. C., Cordova, E. A., Clayton, E. T., Parker, K., E., Ermi, R. M., Baum, S.R., Vermeul, V. R., and Fruchter, J. S., 2008, 300 Area Treatability Test: Laboratory Development of Polyphosphate Remediation Technology for In Situ Treatment of Uranium Contamination in the Vadose Zone and Capillary Fringe, Pacific Northwest National Laboratory publication PNNL-17818, September.

Wellman, D. M., Vermeul, V. R., Fruchter, J. S. and Williams, M. D., 2008, Challenges Associated with Apatite Remediation of Uranium in the 300 Area Aquifer, Pacific Northwest National Laboratory publication PNNL-17480, April.

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Wellman, Dawn, M., Glovack, Julia, N., Parker, Kent, Richards, Emily, L. and Pierce, Eric, M., 2008, Sequestration and retention of uranium(VI) in the presence of hydroxylapatite under dynamic geochemical conditions, *Environmental Chemistry*, 2008, 5,40-50, CSIRO Publishing.

## **Work Plan**

### **Additional Present Value Cost Estimates**

#### **Introduction**

The present value (also referred to as present worth) cost estimates presented in the Supplemental Feasibility Study [SFS] (EMSI, 2011) were based on the Office of Management and Budget (OMB) real discount rate of 2.3% (as of 12-2011). EPA's October 12, 2012 letter indicated that the National Remedy Review Board has recommended that present value calculations be performed using a 7% discount rate.

For reference, EPA guidance directs evaluation of alternatives using a 7% discount rate (NCP, OSWER Directives 9355.3-20 and 9355.0-75) for non-federally financed projects. EPA guidance allows for use of lower or higher discount rate than 7% for the FS present value analysis. EPA guidance also requires evaluation of alternatives for federally funded projects to be based on real discount rates found in OMB Circular A-94 (2.3% for 2011).

#### **Approach**

Pursuant to EPA's request, present value cost estimate calculations will be prepared based on both the current OMB rate and a 7% discount rate. Accordingly, the cost estimates presented in the SFS will be updated to include both discount rates as will any additional estimates to be developed in conjunction with additional evaluations requested by EPA for a Supplemental SFS. The results of these additional estimates will be compared to previous estimates to determine the sensitivity of the cost estimates to the discount rate.

A narrative will also be prepared to explain why both rates are being used for the SFS. The narrative will present a discussion addressing why use of the OMB rate is more appropriate for the SFS based on the following factors:

1. Remedial action for West Lake Landfill OU-1 will be federally-funded (DOE) in part;
2. Fiscally-constrained approaches were identified to address possible Federal (Superfund) funding of the remedial actions; and
3. The likelihood of being able to obtain a 7% pre-tax return over the anticipated near-term period of remedy construction is remote.

#### **Deliverables**

Interim Deliverable – A brief memorandum will be prepared to present the present value cost estimates for the ROD-selected remedy and the two “complete rad removal” alternatives presented in the SFS

based on the OMB rate included in the SFS and a 7% discount rate. Development of cost estimates to be performed in conjunction with the other additional evaluations requested by EPA will also include both the OMB rate and a 7% discount rate.

SFS revisions – the following revisions to the SFS report are anticipated as part of this additional evaluation:

1. Section 6.1.7.3 – Revise text to address use of both 7% discount rate and OMB rate
2. Sections 6.2.1.7, 6.2.2.7, and 6.2.3.7 – Revise the discussion of the present value costs of the alternatives to include both present values based on 7% and OMB discount rates
3. Section 7.2.5 – Revise discussion of present values to include values based on both 7% and OMB discount rates
4. Appendix K – Include present value calculations based on both 7% and OMB discount rates

Please note that at the time the Supplemental SFS is prepared, the present value cost estimates will be updated to reflect the then-current OMB rate, which may differ from the rate used in the SFS or in preparation of the various interim deliverables documenting the results of the additional evaluations requested by EPA.

#### **Clarifications by EPA**

No additional clarification is being requested from EPA at this time.

#### **Schedule**

Preparation of additional present value cost estimates for the ROD-selected remedy and the two “complete rad removal” alternatives and preparation of a brief summary memorandum of the results of these additional evaluations will take approximately three weeks. Preparation of present value costs associated with the other additional evaluations requested by EPA will be completed in accordance with the schedules for completion of these other evaluations.

Preparation of present value costs using both discount rates for the other evaluations requested by EPA will be performed once EPA comments on the interim deliverables, and in conjunction with preparation of a Supplemental SFS.

#### **References**

Engineering Management Support, Inc. (EMSI), 2011, Supplemental Feasibility Study, Radiologically-Impacted Material Excavation Alternative Analysis, West Lake Landfill Operable Unit-1, December 16.

United States Environmental Protection Agency (EPA), 2000, A Guide to Developing and Documenting Cost Estimates During the Feasibility Study, EPA 540-R-00-002/OSWER Directive 9355.0-75, July.

EPA, 1993, Memorandum: Revisions to OMB Circular A-94 on Guidelines and Discount Rates for Benefit-Cost Analysis, OSWER Directive No. 9355.3-20, June 25.